

Better drug knowledge with fewer drugs, both in the young and the old

Running head: Fewer drugs, better drug knowledge

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Abstract

Little is known about drug knowledge of patients, which is relevant for both the compliance and quality of pharmacotherapy. Drug knowledge was quantified in 160 patients in the outpatient clinics of the departments of Internal and Geriatric Medicine. Medication knowledge was generally poor, especially among older patients. Better knowledge was associated with the use of fewer drugs. Caregivers of dementia patients performed as well as younger patients, indicating that older people can perform well, if well-instructed.

List of frequently used abbreviations

GO	Geriatric outpatients without dementia
caregivers of GO patients	Main caregivers of geriatric outpatients with dementia
older IM	Older (≥ 65 years) internal medicine outpatients
younger IM	Younger (18-65 years) internal medicine outpatients

Introduction

Populations worldwide are ageing,¹ due to an increasing life expectancy. Age-related diseases and co-morbidities increase with age.^{2,3} The presence of multiple co-morbidities can lead to polypharmacy, i.e. the use of ≥ 3 drugs.⁴ Over the last decades, the number of complex drug prescriptions has increased considerably.⁵ In 2008 in the Netherlands, 44% of drugs were prescribed to the age-group of persons aged ≥ 65 years,⁶ which constituted 15% of the Dutch population in 2008.⁷

In addition to the high drug use among older adults, this age-group is also frequently seen in acute situations, such as a hospital admission due to an acute illness or trauma.^{8,9} In acute situations, patients may not have their medication with them. Therefore doctors and other medical personnel have to rely on the knowledge provided by the patients about their own drugs.

Multiple previous studies have demonstrated that better drug knowledge improves patients' compliance and is associated with a better result of pharmacotherapy on the target disease.¹⁰⁻¹³ In order to achieve better drug knowledge in patients, attention must be paid to patient information and provision of adequate instructions.¹⁴⁻¹⁶

In the Netherlands there is a paucity of data on patients' drug knowledge, especially in older patients. Therefore, the aim of this study was to investigate the knowledge of outpatients regarding the name (generic and/or commercial), indication, dosage, and administration frequency of their drugs; and to compare younger and older patients.

Methods

This cross-sectional observational study was performed among community-dwelling patients in the outpatient clinics of the departments of Internal Medicine and Geriatric Medicine at the Erasmus MC, a University Medical Center (hereafter Erasmus MC) in Rotterdam, the Netherlands, between March 1st and May 31st, 2005. The study protocol was approved by the Medical Ethics Committee of the Erasmus MC (number MEC-2005-102).

To assess drug knowledge, a standardized interview was performed in all participants by a research fellow (AS) before they visited the physician in the outpatient clinic. The interviewed persons were asked to provide the information about their drugs by heart, because in an acute setting the patient is our first information source. For patients with a diagnosis of dementia, the main caregiver was interviewed, and included in the analysis. Patients, both new and controls, were eligible for inclusion if they were aged 18 years or older, used one or more drugs for at least two weeks prior to the outpatient visit, and signed the consent form before the interview. Persons were excluded if they did not use medication in the last two weeks prior to the visit, or if there was a language barrier resulting in the inability to complete the interview. Patients were allowed to participate only once in the study.

Participants were divided into four groups, depending on which outpatient clinic they visited: (1) older (≥ 65 years) Internal Medicine (IM) outpatients, (2) younger (< 65 years) IM outpatients, (3) GO: geriatric (≥ 65 years) outpatients without dementia, and (4) caregivers of GO patients: main caregivers of geriatric outpatients with dementia.

Data were collected on: age, gender, number of drugs, years of education, and the presence of a diagnosis of dementia before the visit. Four items concerning medication knowledge were noted: drug name (commercial and/or generic), indication, dosage, and administration frequency. Answers were scored dichotomous: correct or incorrect. Patients were asked to give their answer by speaking. For each drug, answers were considered as correct, if the patient was able to recall the generic or commercial drug name. Names that sounded phonetically the same were considered as correct. Data on drug name, dosage, and frequency retrieved from the interview were compared with medication data from the patient's own pharmacist.

All data were stored in an electronic database Statistical Package for the Social Sciences (SPSS) version 16.0.1.1. A multilevel analysis was used in order to estimate probabilities on the level of the patient and on the level of the drug of a patient, because the probability of drug knowledge depends not only on the drug itself or the number of drugs, but also on the patient. If a patient, who uses multiple drugs, knows the first drug, the probability that he will know the second drug as well will increase. Therefore, for every patient an individual probability of knowledge about drugs was estimated. The multilevel analysis showed that there was dependency of the knowledge of drugs: the probability of a correct answer depended on the respondent. All prevalences, relations, and *p*-values were obtained in this way. Statistical analyses were performed with "The R Foundation for Statistical Computing" (R 2.7.1, 2008). A *p*-value <.05 was considered as statistically significant.

Results

One hundred-and-sixty consecutive patients who presented at the participating outpatient clinics were asked to participate. There were no refusals to participate and the groups consisted of: 40 (25%) in the older IM group, 40 (25%) in the younger IM group, 43 (27%) in the GO group, and 37 (23%) in the caregivers of GO patients group. The caregivers of GO patients group were the patient's partner in 32/37 cases, in 5/37 cases the patient was accompanied by a daughter or son. Characteristics of the patients are shown in Table 1. The mean age was 69.1 years (± 16.8 SD) and 51% of the patients were female. All patients together used a total number of 946 drugs, with a mean of 5.9 (± 3.5 SD) drugs per patient. The mean number of years of education was 10.6 (± 4.1 SD). Polypharmacy, the use of 3 or more drugs, occurred in 87% of the patients.

For dementia patients (n=37) we interviewed the main caregiver. For the other three groups (n=123) we interviewed the patients. Differences between the four groups regarding the knowledge of their drugs are shown in Figure 1. Knowledge of the drug name was best in the younger IM group (89%), followed by the caregivers of the GO patients (67%), GO patients (33%), and the older IM group (19%). In 89% the younger IM group knew the indication, compared to 58% of the GO group. The dosage was best-known in the caregivers of the GO patients group (42%) and least-known (6%) of the older IM group. Knowledge of the caregivers of the GO patients group was comparable with that of the younger IM group.

In order to compare the medication knowledge of younger patients versus older patients, the older IM and GO were aggregated and compared with the younger IM group

(Table 2). The younger IM outpatients had a statistically significant better drug knowledge compared to the group aged 65 years and over.

In all groups, poorer knowledge of the indication was significantly associated with a higher number of drugs ($p=0.003$) (Figure 2). There was no significant association between the number of drugs and knowledge of the name or the administration frequency. There was no significant association between drug knowledge and years of education or gender.

Discussion

In this study, drug knowledge of patients was analyzed by a standardized interview in the outpatient clinics of the departments of Internal Medicine and Geriatric Medicine. Patients below the age of 65 years were best in recalling their medication. In older patients (aged 65 years and older) the knowledge was limited for all items (name, indication, dosage, and administration frequency). Only 62% of all interviewed older patients knew the indication for their drugs. However, caregivers of dementia patients were generally quite well informed, comparable with the younger IM group. Knowledge of the dosage was poor in all groups, but was especially poor among the older patients (9%).

Previous studies in other countries have reported a poor knowledge of the drug name,¹⁰ indication,¹⁷⁻¹⁹ and dosages,¹⁷ especially in older patients. This is in line with our results. A statistically significant negative association was found between the number of drugs and the knowledge of the indication, which was in accordance with findings of other studies.^{20, 21}

As far as we are aware from the literature, this study is the first to describe medication knowledge in the Netherlands. A new finding of this study is that the knowledge (about used drugs) of the caregivers of patients with dementia (*e.g.* older partners) was relatively good, and almost reached the level of the younger patients. This finding suggests that it is well possible to educate older persons about pharmacotherapy. A possible explanation for this finding might be that the caregivers of patients with dementia are very closely involved in the daily care of the patient.

A risk of being unfamiliar with the drug usage may result in an increased risk of an Adverse Drug Reaction. Approximately 50% of all serious ADR requiring hospitalization is preventable.²² The majority of those hospitalizations are due to wrong usage of the drugs by the patients.²² Another risk factor is the usage of multiple drugs, and especially older adults are the main consumers of multiple drugs. Therefore this age-group is at increased risk of both mild and serious ADR due to the use of an increased number of drugs. Both factors contributed most likely to the rapidly increasing trend of ADR-related Emergency Department visits and hospitalizations in the USA,²³ Australia²⁴ and the Netherlands²⁵ over the last decades.

A strength of this study was that there were no refusals to participate, and that patients were unaware of the study before their outpatient visit. Consequently, patients were not able to prepare themselves for any of the questions. This gives a reliable reflection of the real life situation. If the patient forgets his or her medication list or box in an acute situation, information provided by the patient is the only information available for the first hours or longer.

A limitation of this study might be that the study population consisted of a small group of outpatients of a university hospital, which might affect the generalizability of

the findings. However, most patients in this study population (87%) used three or more drugs, with a mean of 5.9 drugs, which is consistent with other studies.²⁶

Several patient education programs have been developed.^{15, 27, 28} Effective methods include written medication instructions for the patient, simplified medication regimens and a self medication program, which instructs patients how to manage their medication.²⁹ These strategies have been shown to improve drug knowledge. Such education strategies should be further implemented and become a standard part of the physician and pharmacist consultation with older patients.

In conclusion, our study demonstrates that better drug knowledge was associated with the use of fewer drugs, and that drug knowledge of older caregivers can be equal to that of younger people, if they are well-instructed. This study implies that the number of drugs of older patients should be reduced where possible, and that patient education about medication remains needed in all age groups.

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Table 1. Patient Characteristics per Group for Gender, Age, Number of Drugs and Years of Education of the Study Population

Characteristic	Overall	Geriatric outpatients without dementia	Geriatric outpatients with dementia*	Internal Medicine outpatients ≥65 years	Internal Medicine outpatients <65 years
Number	160	43	37	40	40
Men (%)	49%	47%	76%	40%	37%
Age (± SD)	69.2 ± 16.8	80.8 ± 6.0	79.9 ± 5.4	71.7 ± 5.0	44.2 ± 12.6
Number of drugs (± SD)	5.9 ± 3.5	6.8 ± 3.9	5.3 ± 3.2	7.0 ± 3.7	4.5 ± 2.7
Years of education (± SD)	10.6 ± 4.1	9.3 ± 3.4	10.1 ± 3.2	9.0 ± 3.3	14.1 ± 4.2

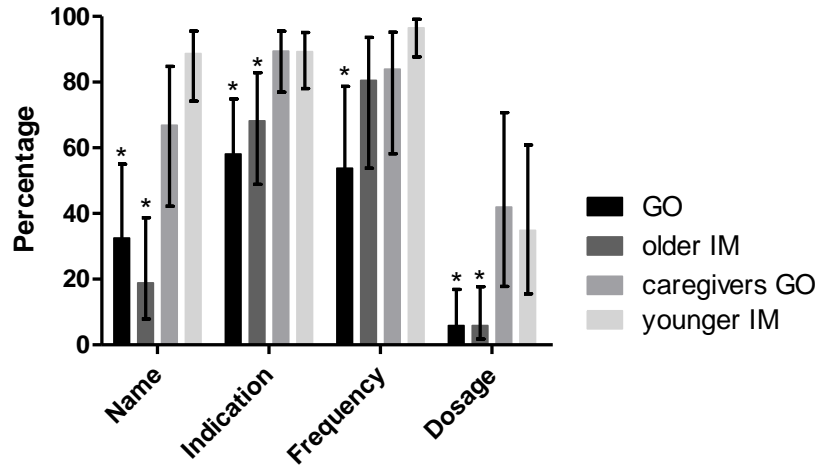
* Data is of the dementia patients, and not of the caregivers.

Table 2. Drug Knowledge, Comparison between Older and Younger Patients (caregivers were excluded)

Knowledge of the *	Internal Medicine and Geriatric outpatients ≥65 years (n=83)	Internal Medicine outpatients <65 years (n=40)	<i>p</i> -value
- name, no (%)	22 (26)	36 (89)	<0.001
- indication, no (%)	51 (62)	36 (89)	0.002
- administration frequency, no (%)	57 (69)	39 (37)	<0.001
- dosage, no (%)	7 (9)	14 (35)	0.002

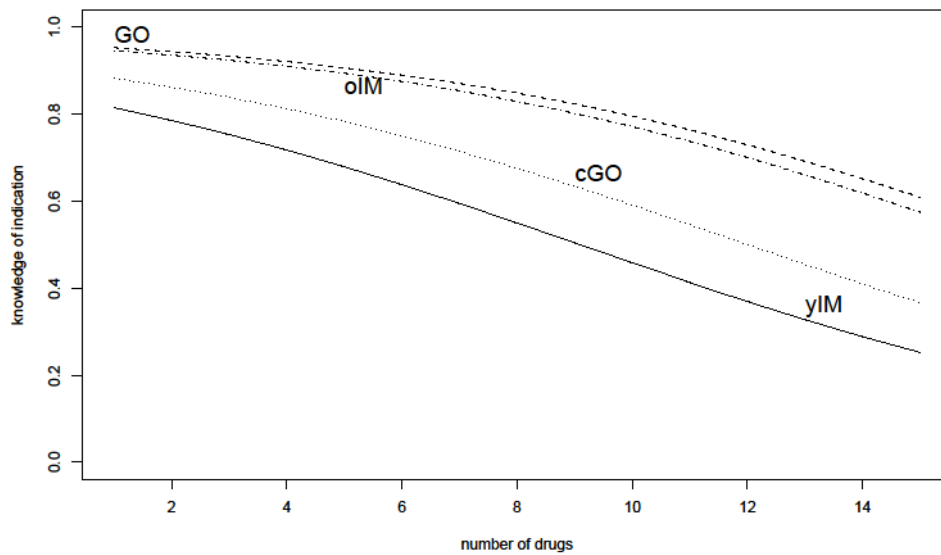
*Shown percentages (95% confidence interval). Prevalences, with 95%CI, were estimated with a multilevel analysis

Figure 1. Medication Knowledge per Group for Name, Indication, Administration Frequency and Dosage



Older IM: Older (≥ 65 years) internal medicine outpatients (n=40); younger IM: Younger (<65 years) internal medicine outpatients (n=40); GO: Geriatric outpatients without dementia (n=43); caregivers GO: Main caregivers of geriatric outpatients with dementia (n=37). The error bars indicate the 95% Confidence Interval. (*) indicates a significant difference $p < .05$ compared to the reference group: younger IM patients.

Figure 2. Association between the Number of Drugs and Knowledge of the Indication



Older IM: Older (≥ 65 years) internal medicine outpatients (n=40), younger IM: Younger (<65 years) internal medicine outpatients (n=40), GO: Geriatric outpatients without dementia (n=43), caregivers GO: Main caregivers of geriatric outpatients with dementia (n=37).